

REMARKS

Claims 1-14 are pending in the application, of which Claims 1, 11, and 14 are independent. In the Office Action mailed on August 23, 2006, Claims 1-13 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,083,302, issued to Tsuyuguchi et al. (hereinafter "Tsuyuguchi"). Further, Claim 14 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Tsuyuguchi, in view of U.S. Patent No. 5,182,739, issued to Kime et al. (hereinafter "Kime").

Claims 1, 11, and 14 are presently amended. For the reasons discussed below, applicant respectfully submits that independent claims 1, 11, and 14 are in condition for allowance. Further, Claims 2-10, 12, and 13 that depend from these independent claims are also allowable.

The Rejection of Claims 1-13 Under 35 U.S.C. § 102(b)

Claims 1-13 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,083,302 (Tsuyuguchi).

Tsuyuguchi is directed to an optical tracking servo apparatus for performing tracking control of a light beam irradiated on an information recording surface on a predetermined track of an optical disk by detecting light reflected from the surface of the optical disk. (Col. 1, lines 5-12.) A focusing assembly 12 comprises an objective lens 16, an objective lens driving portion 17, a base 34, and guide shafts 35. (Fig. 3; Col. 5, lines 34-37.) A pair of linear motors 15 drives the focusing assembly 12 so that it travels along the guide shafts 35 in a direction X, which is parallel to and in the radial direction of the optical disk 13. (Col. 5, lines 37-55.)

The objective lens driving portion 17 is provided on the base 34 of the focusing assembly 12 and has a holding member 40 and a piezoelectric device 41. (Col. 5, lines 37-38 and 61-62.) The holding member 40 comprises a fixed portion 40a, which is attached to the

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base 34, and a rotatable portion 40b extending in a direction Y, which is perpendicular to direction X. (Col. 5, line 66-Col. 6, line 3.) The fixed portion 40a is attached to the rotating portion 40b by a pivot portion 40c having a small cross section. (Col. 6, lines 3-6.) The objective lens 16 is held by the holding member 40 at a distance L from the pivot portion 40c of the holding member 40. (Fig 3).

The piezoelectric device 41 is provided so as to extend in the direction X, with one end connected to the fixed portion 40a of the holding member 40 and another end connected to the rotational portion 40b of the holding member 40. (Col. 6, lines 26-30.) When voltage is applied to the piezoelectric device 41, the piezoelectric device 41 extends or retracts in the direction X, causing the rotating portion 40b of the holding member 40 to rotate around the pivot portion 40c parallel to the optical disk 13. (Col. 6, lines 30-39.) As a result, the objective lens 16 is displaced in the direction X parallel to and in the radial direction of disk 13. (Col. 6, lines 39-41.)

Tracking control is accomplished by using the piezoelectric device 41 as the driver for displacing the objective lens 16 in the radial direction of the disk 13.

Claim 1

As amended, Claim 1 recites "An objective lens drive for adjusting the tilt of an optical axis of an objective lens to be used for radiating light onto a recording medium." The drive comprises "a lens holder for holding said objective lens," "a suspension which is at one end thereof fixed to said lens holder and which supports the lens holder in a cantilever fashion," and "a suspension holder for supporting the other end of said suspension." Claim 1 further comprises "a plurality of multilayer piezoelectric elements which laterally support said suspension holder, wherein at least a first of said multilayer piezoelectric elements laterally supports a first side surface of said suspension holder and at least a second of said multilayer piezoelectric elements

laterally supports a second side surface of said suspension holder opposite to said first side surface, and wherein said first and second multilayer piezoelectric elements are displaced in opposite directions to rotate said suspension holder about an axis extending in a direction in which said suspension extends."

The invention of Claim 1 comprises at least two separate piezoelectric elements, each element supporting a side of the suspension holder opposite to the other element. Further, the piezoelectric elements extend and retract in opposite directions to cooperatively rotate the suspension holder. In contrast, Tsuyuguchi discloses a device having a single stack of piezoelectric elements. The stack extends or retracts in one direction only (because one end of the piezoelectric device 41 is connected to the "fixed portion 40a" of the holding member 40) to rotate a holding member 40 around a pivot portion 40c.

Accordingly, the withdrawal of the rejection of Claim 1 as being anticipated by Tsuyuguchi is respectfully requested. Further, Claims 2-10, which depend from Claim 1 are also allowable.

Claim 11

Similar to Claim 1, Claim 11 recites an "objective lens drive for adjusting the tilt of an optical axis of an objective lens to be used for radiating light onto a recording medium" having "a lens holder for holding the objective lens," "a plurality of suspensions" to "support said lens holder in a cantilever fashion," and "a suspension holder." As presently amended, Claim 11 further recites "first and second piezoelectric elements which attach said suspension holder to a carriage, which are fixed at one end thereof to said carriage and which are provided so as to extend in the tracking direction, said first piezoelectric element attaching to a first side surface of said carriage and said second piezoelectric element attaching to a second side surface of said carriage opposite to said first side surface; and axial support means for axially supporting said

suspension holder so that the suspension holder is rotatable in a radial direction of said recording medium, wherein torque is applied to said suspension holder by means of displacement of said first piezoelectric element in a first direction and displacement of said second piezoelectric element in a second direction opposite said first direction, so that said suspension holder is rotated in the radial direction of said recording medium."

The invention of Claim 11 comprises at least two piezoelectric elements, which support opposite sides of the suspension holder. Also, the claimed piezoelectric elements are displaced in opposite directions to rotate the suspension holder. Tsuyuguchi discloses a device having a single stack of piezoelectric elements, wherein the stack extends or retracts in one direction only (because one end of the piezoelectric device 41 is connected to the "fixed portion 40a" of the holding member 40) to rotate a holding member 40 around a pivot portion 40c.

Accordingly, the withdrawal of the rejection of Claim 11 as being anticipated by Tsuyuguchi is respectfully requested. Further, Claims 12 and 13, which depend from Claim 11, are also allowable.

The Rejection of Claim 14 Under 35 U.S.C. § 103(a)

Claim 14 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Tsuyuguchi in view of U.S. Patent No. 5,182,739 (Kime).

In rejecting Claim 14, the Examiner states that Tsuyuguchi does not explicitly disclose but Kime does disclose a tilt sensor for detecting the direction and magnitude of a tilt made between said optical disk and an optical axis of said objective lens (Col. 3, line 57); wherein a plurality of said multilayer piezoelectric elements are actuated in accordance with the magnitude and direction of tilt detected (Col. 3, line 66-Col. 4, line 7; Col. 4, lines 10-15). Based on the above, the Examiner concludes it would have been obvious to one ordinarily skilled in the art at the time of the invention to modify the teachings of Tsuyuguchi and have a tilt sensor for

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detecting the direction and magnitude of a tilt made between said optical disk and an optical axis of said objective lens, and a plurality of said multilayer piezoelectric elements actuated in accordance with the magnitude and direction of tilt detected, as disclosed by Kime, in order to maintain a disk and an optical head in orthogonal relation.

Kime teaches an optical head that detects the inclination of the optical axis of light beams to a disk surface irradiated for recording and regenerating information to/from the disk and keeps the optical axis of the light beams orthogonal to the disk surface. (Col. 1, lines 7-11.) More specifically, an optical head base 31 is joined to four corners of an actuator base 30 by four piezoelectric elements 51a-51d, wherein the central part of the actuator base 30 is supported by a pivot shaft 50, which is screwed into the optical head base 30. (Col. 3, lines 41-43; Col. 3, line 66-Col 4, line 3.) Tilt sensors 41 detect the tilt of the object lens 14. (Col. 4, lines 37-39.) The tilt is corrected by selectively applying voltage to the piezoelectric elements 51a-51d. (Col. 4, lines 10-15.) The controlled expansion and compression of the piezoelectric elements 51a-51d cause the actuator base to tilt in the radial direction and in the orthogonal direction thereto in accordance with a detected tilt. (Col. 4, lines 36-39.)

Claim 14

Claim 14 recites an optical disk drive comprising "a lens holder," a suspension that "supports said lens holder in a cantilever fashion," and "a suspension holder for supporting the other end of said suspension." As amended, Claim 14 further recites: "a plurality of multilayer piezoelectric elements which laterally support said suspension holder, at least a first of said multilayer piezoelectric elements laterally supporting a first side surface of said suspension holder and at least a second of said multilayer piezoelectric elements laterally supporting a second side surface of said suspension holder opposite to said first side surface to thereby make said suspension holder rotatable about an axis extending in a direction in which said suspension

extends; and a tilt sensor for detecting the direction and magnitude of a tilt made between said optical disk and an optical axis of said objective lens, wherein at least the first and second multilayer piezoelectric elements are actuated in accordance with the magnitude and direction of tilt detected by said tilt sensor to thereby cause displacement of the first multilayer piezoelectric element in a first direction and displacement of the second multilayer piezoelectric element in a second direction opposite said first direction, whereby said tilt is corrected by means of said displacements.

As previously discussed, Tsuyuguchi does not teach or suggest a device wherein first and second piezoelectric elements laterally support opposite side surfaces of the suspension holder. Further, Tsuyuguchi does not teach that the first and second piezoelectric elements are displaced in opposite directions to correct a detected tilt. Further, Kime does not teach or suggest these limitations either. For a *prima facie* rejection, the prior art references must teach or suggest every limitation of the claims. Even a theoretical combination of Kime with Tsuyuguchi would not remotely teach or suggest every element of Claim 14.

Accordingly, the withdrawal of the rejection of Claim 14 as being unpatentable over Tsuyuguchi in view of Kime is respectfully requested.


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CONCLUSION

In view of the foregoing amendments and remarks, applicant submits that Claims 1-14 are in condition for allowance. If the Examiner has any further questions or comments, the Examiner may contact the applicant's attorney at the number provided below.

Respectfully submitted,

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